NUI Galway
OÉ Gaillimh

Semester 1 Examinations 2019 / 2020

Exam Code(s)	4BCT1, 4BP1
Exam(s)	B.Sc. Degree (Computer Science & Information Technology) Bachelor of Engineering (Electronic and Computer Engineering)
Module Code(s)	CT417
Module(s)	Software Engineering III
Paper No.	1
External Examiner(s)	Dr. Jacob Howe
Internal Examiner(s)	Prof. Michael Madden *Stephen Bradshaw Dr. Matthias Nickles Dr. Michael Schukat

Instructions: Answer any 3 questions.
All questions carry equal marks.

Duration	2 hrs
No. of Pages	3 (including cover page)
Department(s)	School of Computer Science
Requirements	None

Q1. (20 marks)

(a) When making a commit to an online repository from your laptop, what is the sequence of **git commands** that have to be executed? Explain the reasoning behind each step. You may assume the repository has already been cloned to your hard drive.

4 Marks

(b) Take two **software architectural styles** that have been discussed in lectures and discuss key aspects on where they might have traits in common and where they would differ.

8 Marks

(c) Distinguish between the cloud service types:

a. IaaS
b. PaaS
c. SaaS

Provide examples of typical customer needs that would be served by each of the above.

3 Marks

(d) Distinguish between an **architectural style** and a **design pattern**. Use examples to illustrate your answer.

5 Marks

Q2. (20 marks)

(a) Take two **design patterns** discussed over the term. Using an UML diagram illustrate how these patterns are coded, and discuss how they are implemented. Outline some benefits that result from using these patterns.

8 Marks

(b) In software engineering what do we mean when we say a **component provides a service**?

2 Marks

(c) Distinguish between the following terms used in **virtualisation**:

- Type 1 hypervisor and type 2 hypervisor
- Host machine and guest machine
- Virtual appliances
- Docker

6 Marks

(d) List and explain 3 potential errors that might happen when a proxy is used in place of a **callback object**.

4 Marks

Q3. (20 marks)

(a) Describe and summarise the core components of a modern **continuous software development system** as discussed in the lectures. In your answer outline how these components interact, and how they are inter-linked.

6 Marks

(b) Identify the key differences between a **monolithic kernel** and a **microkernel**.

5 Marks

(c) In the context of plugin architectures, what does **POSA** define as the key actors involved?

3 Marks

(d) Discuss which **design pattern** might be most effectively used in a plugin environment to improve efficiency. Identify and explain how this pattern might work.

6 Marks

Q4. (20 marks)

(a) What is the **CAP Theorem**? How do **ACID** and **BASE** transactions relate to it?

4 Marks

(b) Illustrate with a diagram a **design pattern** that we have covered in the course. What is the strength of using design patterns?

6 Marks

(c) Using diagrams distinguish between the following **networking options** as supported by Oracle VirtualBox, thereby outlining their characteristics and disadvantages:

- NAT
- Bridged adapter
- NAT network

5 Marks

(d) In the **layered architecture**, what is the purpose of an open layer? List two other layers and outline what purpose they may serve.

5 Marks